ABSTRACT

The cellular structure of the power device includes a substrate that has a highly doped drain region. Over the substrate there is a more lightly doped epitaxial layer of the same doping. Above the epitaxial layer is a well region formed of an opposite type doping. Covering the wells is an upper source layer of the first conductivity type that is heavily doped. The trench structure includes a sidewall oxide or other suitable insulating material that covers the sidewalls of the trench. The bottom of the trench is filled with a doped polysilicon shield. An interlevel dielectric such as silicon nitride covers the shield. The gate region is formed by another layer of doped polysilicon. A second interlevel dielectric, typically borophosphosilicate glass (BPSG) covers the gate. In operation, current flows vertically between the source and the drain through a channel in the well when a suitable voltage is applied to the gate.